

a1 The present invention provides an alternator through-bolt that is more resistant to fatigue than conventional alternator through-bolts. The fatigue life of the through-bolt is increased by causing the highest stress to occur away from the threads. This is accomplished by reducing the diameter of the shank of the bolt until the highest stress occurs on the shank. Stresses at the threads are correspondingly lower. The advantage in moving the high stress away from the threads offsets any disadvantage of correspondingly higher stress at the shank of the bolt because there is no appreciable stress concentration factor for the shank (and the concentration factor for rolled threads is about 3). The result of this change to fatigue life is non-linear, which allows improvement of the bolt life by making the shank weaker.

Substitute the following for the paragraph beginning on page 2, line 25.

a2 Accordingly, a through-bolt in accordance with the present invention is for use with an AC generator having a housing including a drive-end portion and a mounting-end portion. A stator is mountable between the drive-end portions. A rotor is mounted for rotation within the housing. One of the end portions includes a plurality of circumferentially spaced ears having first apertures therein and the other end portion includes a corresponding plurality of circumferentially spaced ears having threaded apertures therein. The through-bolt is inserted through one of the first apertures and received in one of the threaded apertures to bolt the housing ends together against the stator. The through-bolt is subject to bending stress since it does not operate on a solid stack up. The through-bolt comprises a head portion, an elongated shank portion, and a threaded portion extending from the elongated shank portion. The shank portion is necked-down adjacent the threaded portion to a diameter sufficiently less than a minor diameter of the threads in the threaded portion such that the resistance of the through-bolt to fatigue failure is increased.

Substitute the following for the paragraph beginning on page 4, line 19.

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The through-bolt 26 comprises a head portion 32, an elongated shank portion 34, and a threaded portion 36 extending from the elongated shank portion. The shank portion 34 includes a necked-down feature or portion 38 adjacent the threaded portion 36 necked down to a diameter sufficiently less than a minor diameter of thread in the threaded portion 36 to encourage maximum stresses to occur away from the threads. The end portions adjacent ears 22, 28 are deformed during installation by the clamp load of the bolts acting on the overhung or cantilevered outer edges of the end portions. This deformation subjects the through-bolt to bending stress since the bolt does not operate on a solid stack up. This bending stress can lead to fatigue failure of the bolt due to vibration of the alternator during vehicle operation. However, the necked-down shank portion increases the resistance of the through-bolt to fatigue failure associated with the mechanical stresses imposed on the through-bolt through the bending stresses, engine and generator vibration, the pull associated with the generator drive belt, and the cantilevered disposition of the generator on the engine.

[Substitute the following for the paragraph beginning on page 5, line 4.]

FIGS. 3-5 illustrate the various embodiments of through-bolt 26 which have been shown to increase the fatigue resistance of the through-bolt in use. FIG. 3 illustrates through-bolt 26 having a necked-down feature 38 adjacent the threaded portion 36 of the bolt. FIG. 4 illustrates another embodiment of the through-bolt 40 wherein the elongated shank portion 42 is necked-down at 44 generally from its head portion 32 to its threaded portion 36. FIG. 5 illustrates yet another embodiment of the through-bolt 46 wherein the shank portion 48 includes two or more spaced necked-down portions 50. Each of these embodiments has been found to provide an increased fatigue failure resistance vis-à-vis a conventional electrical generator through-bolt.

In The Claims:

Amend claims 1 and 5 as follows:

1. (Amended) A through-bolt for use in combination with an electrical AC generator having a housing including a drive-end portion and a mounting-end portion, a stator mountable between said drive-end and mounting-end portions, and a rotor mounted for rotation within said housing, one of said end portions including a plurality of circumferentially spaced ears having first apertures therein and the other of said end portions including a corresponding plurality of circumferentially spaced ears having threaded apertures therein whereby a through-bolt is inserted through one of said first apertures and received in one of said threaded apertures to bolt said housing ends together against said stator, whereby the through-bolt is subject to bending stress since it does not operate on a solid stack up, said through-bolt comprising:

a head portion;

an elongated shank portion; and

a threaded portion extending from said elongated shank portion;

said shank portion being necked-down adjacent said threaded portion to a diameter sufficiently less than a minor diameter of threads in said threaded portion such that the resistance of said through-bolt to fatigue failure is increased.

5. (Amended) An electrical AC generator having a housing including a drive-end portion and a mounting-end portion, a stator mountable between said drive-end and mounting-end portions, and a rotor mounted for rotation within said housing, one of said end portions including a plurality of circumferentially spaced ears having first apertures therein and the other of said end portions including a corresponding plurality of circumferentially spaced ears having threaded apertures therein whereby a through-bolt is inserted through one of said first apertures and received in one of said threaded apertures to bolt said housing ends together against said stator, whereby the through-bolt is subject to bending stress since it does not operate on a solid stack up, said through-bolt comprising:

a head portion;

an elongated shank portion; and

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a threaded portion extending from said elongated shank portion;

said shank portion being necked-down adjacent said threaded portion to a diameter sufficiently less than a minor diameter of threads in said threaded portion such that the resistance of said through-bolt to fatigue failure is increased.

In The Abstract:

Substitute the following paragraph for the previous Abstract.

ab
A through-bolt for use with an AC generator has a housing including a drive-end portion and a mounting-end portion. A stator is mountable between the drive-end portions. A rotor is mounted for rotation within the housing. One of the end portions includes a plurality of circumferentially spaced ears having first apertures therein and the other end portion includes a corresponding plurality of circumferentially spaced ears having threaded apertures therein. The through-bolt is inserted through one of the first apertures and received in one of the threaded apertures to bolt the housing ends together against the stator. The through-bolt is subject to bending stress since it does not operate on a solid stack up. The through-bolt comprises a head portion, an elongated shank portion, and a threaded portion extending from the elongated shank portion. The shank portion is necked-down adjacent the threaded portion to a diameter sufficiently less than a minor diameter of the threads in the threaded portion such that the resistance of the through-bolt to fatigue failure is increased.
